BUTTERFLIES OF THE PARIA PENINSULA, NE VENEZUELA

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The rocky Paria Peninsula represents the last of a series of isolated mountain groups extending east from the Andes on continental South America (the chain terminates 25 miles further east in the mountains of Trinidad). Originally cloaked in rain forest, man has cleared or otherwise damaged the lower altitudes of all these mountain groups, leaving 'islands' displaying comparatively undamaged montane rain forest. These mountain groups provide a classic demonstration of island biogeographical theory (MacArthur & Wilson, 1967)—the number of species from the parent Andean population decreasing with increasing separation from the Andes (Phelps, 1966; Haffer, 1974; for birds). The Parian Montane Centre, of which the Paria Peninsula is part, has been identified as an important centre of endemism within South America (Cracraft, 1985).

The observations described below represent part of the activities of the Cambridge Columbus Zoological Expedition to Venezuela 1988, which spent 7 weeks in the region of Macuro (ca 10°35′N 62°08′W) in late July and August 1988. Macuro lies just outside the southern boundary of the 11-year-old Paria Peninsula National Park which has received relatively little scientific attention. The expedition's aims were to study the bird, dragonfly and butterfly species present in the area, if possible identifying rare or endemic species and their ecological requirements, and thus to provide information useful in Park management and assessment.

THE STUDY AREA

The vegetation found in the region of Macuro has been described by Bond *et al.* (1989). Butterfly samples were taken by netting or photography in the following areas: Zone A rough cultivated land in and around the village of Macuro, and a coastal path eastwards to Aricagua bay. Zone B secondary forest in varying stages of regeneration on paths north from Macuro and Aricagua to the 400 m contour (the southern boundary of the National Park). Zone C forest in the region of Rancho Los Chorros (the expedition's base), at 400–550 m on the cross-peninsula path from Macuro to Uquire (this zone contained a mixture of mature secondary and lower montane forest types, and also three recently abandoned small plantations). Zone D primary montane forest above 550 m on the path mentioned in zone C, and on the study transect used by the Expedition between the Rancho and the summit of Cerro El Olvido at 885 m (the forest at this height showed characteristics of cloud forest). The forest types found on the transect were classified as lower or upper montane forest (*sensu* Grubb & Tanner, 1976). Zone E dry scrub to a height of 200–300 m above Uquire, on the steeper northern side of the peninsula.

Observations were concentrated in zones A, B and C, with weather limiting forays into zone D. Uquire (zone E) was visited once. The majority of specimens collected were identified by Dr M. Cock, of the CAB International Institute of Biological Control, Nairobi, Kenya.

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Species list

Species not occurring on Trinidad are indicated by 'not T'; species recorded as single specimens are indicated by '*'.

Hesperiidae

Moeris vopiscus vopiscus Herr.-Sch. Zone C, frequent

Panoquina sylvicola Herr.-Sch. Zone C, frequent

Ouleus fridericus. Zones A,B, several seen

Urbanus dorantes dorantes Stoll. Zones A,C, frequent around rancho

Urbanus doryssus doryssus Swain. Zones C,D, several seen

Urbanus tanna Evans. Zone B, frequent

Phareas coeleste West. Zone C, *, near stream. Not T

Talides sinois sinois Hubn. Zone C, *

Chioides catillus catillus Cramer. Zone A, common

Polygonus manueli manueli Bell & Comstock. Zone D,*

Epargyreus socus ?chota Evans. Zone D, *

Astraptes fulgerator fulgerator Walch. Zone D, *, in sunpatch

Astraptes anaphus Cramer. Zone D, *

Vettius phyllus phyllus Cramer. Zone D, just above zone C, *

Phanus marshalii Kirby. Zone C, two seen

Quadrus cerealis Stoll. Zone C, *

Entheus priassus priassus Linnaeus. Zone C, *

Pyrgus orcus Stoll. Zones B,C

Synapte malitiosa pericles Moschler, Zone A, frequent

Lerema ancillaris ancillaris Butler. Zone A, frequent

Aguna coelus Stoll. Zone C, *

Papilionidae

Papilio torquatus Cramer. Zone B,C,

Papilio thoas L. Zone A, low altitudes in zone B, in clearings near streams, frequent

Parides anchises cymochles Doub. Zone A

Battus polydamas L. Zones A,B,C,E, frequent

Pieridae

Phoebis rurina Felder. Zone C, several seen. Not T

Phoebis sennae L. Zone A, common

Eurema leuce Bois. Zones A,B,C, common

Eurema ?venusta Bois. Zone A, common

Eurema albula Cramer. Zones A,C, common

Eurema gratiosa Doub. Zone A, several seen in Macuro

Ascia monuste L. Zone A, low altitude in Zone B, common

Lycaenidae

Arawacus aetolus Sulzer. Zones B,C, several seen

Riodinidae

Mesosemia methion Hew. Zone C, several seen. Not T

Mesosemia phace Godman. Zone C, two seen. Not T

Nymula calyce F. Zone A, *

Dynamine mylitta Cramer. Zone A, several seen

Danainae

Lycorea cleobaea Doub. Zones B,C,D, frequent

Danaus plexippus L. Zones A,E, common, C, occasional

Danaus eresimus Cramer. Zone A, frequent

Libytheinae

Libythea carinata Cramer. Zone E, *

Nymphalinae

Smyrna blomfildia Hubn. Zone C, frequent, feeding on rotting fruit, doubtful resident of Trinidad

Archaeoprepona amphimachus F. Zones B, occasional, C, frequent, feeding on damaged fruit, usually while still on tree

Catonephele acontius L. Zone C, *, feeding on rotting fruit

Hamadryas arethusa Cramer. Zones A,B,C, common

Hamadryas amphinome L. Zones A,B,C, common

Hamadryas laodamia Cramer. Zone C, *

Colobura dirce L. Zone C, *

Mestra hypermestra. Zone B,E, several seen

Precis lavinia. Zone A, common

Anartia jatrophe L. Zone A, common

Anartia amathea L. Zone A, common

Myscelia leucocyana. Zone B, two seen

Marpesia chiron F. Zone A,C

Marpesia petreus Cramer. Zones A,B, several seen in partly shaded areas

Siderone marthesia Cramer. Zone C, *

Janatella leucodesma Felder & Felder. Zone A, several seen

Heliconiinae

Heliconius erato L. Zones B,C, frequent

Heliconius hecale barcanti Brown. Zone C,

sunlit openings in forest, frequent (Not T (one vagrant record M. Cock. pers. comm.)
Heliconius ethilla Godart. Zone D, *
Heliconius clysonymus clysonymus Latr. Zone C, *. Not T
Dryas julia F. Zones C,D,E, common

Ithomiinae
Mechanitis lycimnia F. Zones B,C, frequent
Mechanitis isthmia Bates. Zones B,C, frequent
Hymenitis andromica Hew. Zone C, several flying amongst shaded forest undergrowth
Greta andromica andromica. Zone C, *. Wing-tips more extensively black than Trinidad specimens (M. Cock, pers. comm)
Aeria eurimedia Cramer. Zones C (above 500 m altitude),C, several seen
Ithomia iphianassa Doub & Hew. Zone C, several seen
Pteronymia artena Hew Zone C, *
Hypoleria ocalia Doub. & Hew. Zone B, low altitudes, several seen

Brassolinae
Opsiphanes cassiae L. Zone C, frequent feeding on rotting fruit
Caligo eurilochus Cramer. Zones B,C; particularly frequent in mango plantations near Macuro, feeding on rotting fruit
Eryphanis polyexena Meerburg. Single specimens, Zones A,C; several seen separately, Zone D
Dynastor darius Fabricius. Zone D, one specimen at 850 m

Morphinae
Morpho peleides Koll. Zones B,C,D (up to 600 m), frequent. Individuals appeared to 'trapline' along forest streams in Zones B and C

Satyrinae
'Euptichia' hermes F. Zones B,C, common, flying low amongst vegetation
'Euptychia' hesione Sulzer. Zone C, frequent
'Euptychia' arnea F. Zone C, frequent

Two day-flying moth species were also noted:

Geometridae
Cyllopa jatropharia L. Zone C

Uraniidae
Urania leilus L. Zone A. Individuals seen flying along beach in Macuro

The information given above is summarized in two tables. Table 1 identifies the number of species from each family or sub-family recorded in each forest zone. Table 2 identifies families containing non-Trinidadian species, and the forest zones from which these were recorded.

Table 1. Summary of the forest zones frequented by identified species from each family[1].

Family / Zone	Total N sp.	Hesperiidae	Papilionidae	Pieridae	Lycaenidae	Riodinidae	Danainae	Libytheinae	Nymphalinae	Heliconiinae	Ithomiinae	Brassolinae	Morphinae	Satyrinae
A	28	6	3	6	0	2	2	0	8	0	0	1	0	0
B	22	3	2	2	1	0	1	0	6	1	3	1	1	1
C	48	11	2	3	1	2	2	0	9	4	7	3	1	3
D	13	6	0	0	0	0	1	0	0	2	1	2	1	0
E	5	0	1	0	0	0	1	1	1	1	0	0	0	0
N species in each family[2]		21	4	7	1	4	3	1	16	5	8	4	1	3

[1] Five specimens remain to be identified (two lycaenids, two nymphalids and one satyrid). Distributional data for these is not included in Table 1, but was used in compiling Table 2.
[2] As each species could be recorded from several zones, this figure does not equal the sum of the relevant column.

Table 2. The occurrence of species not found on Trinidad in the Paria fauna; each family considered separately (including data on five species yet to be identified—see Table 1).

Family	N species recorded on Paria	N non-Trinidadian species	Zones non-Trinidadian species found
Hesperiidae	21	1	C
Pieridae	7	1	C
Lycaenidae	3	2	B(low alt.),C
Riodinidae	4	2	C,C
Nymphalinae	18	3	B,C,C,
Heliconiinae	5	2	C,C,
Satyrinae	4	1	B/C

Discussion

It is clear from Table 1 and the species list that many species do not occur in one zone exclusively. This is likely to be an artefact of the way in which the zones were defined, which was dictated by fieldwork practicalities, and the fact that the forest types did not have distinct boundaries. The zones most affected in this way were zones B and C. The former contained a mixture of open tracks, active and disused plantations, and secondary forest growth in varying stages of regeneration; the latter was an area of mature secondary growth overlapping with the lower boundary of undamaged montane forest, but also containing some small clearings due to plantations. The narrowness of the Peninsula (4–5 miles in the region of Macuro) also compresses the size of the zones, giving only short distances between them.

A number of broad generalizations can still be made. 1. Species representative of more mature forest (primary or secondary, zones C and D) are drawn from Hesperiidae, Nymphalinae, Heliconiinae, Ithomiinae, Brassolinae and Satyridae. 2. Species representative of coastal or extensively cultivated land (zones A and B) are drawn from Pieridae, Danainae and Nymphalinae. Libytheinae (zone E) may also be included in this category. 3. Species of Papilionidae and Brassolinae were mainly recorded in secondary growth. 4. Individual species of each family may be restricted to one forest type, though generally can cope with a range of habitats. There was no clear separation of species found in primary or mature secondary forest.

The forests of the Paria Peninsula have not suffered the clear felling which has destroyed much forest in South America. Rather, small areas are cleared for crops, mainly banana, cacao, maize and some coffee. This process has resulted in almost complete replacement of primary forest on the more populated southern coast of the Peninsula to a height of 400–500 m in the region of Macuro, and, further west, to a height of approximately 800 m on Cerro Patao (Bond *et al.*, 1989). The northern side of the Pensinula is less developed, with partial replacement to a height of 200–300 m in the region of small villages such as Uquire. The eastern part of the Paria Peninsula National Park, whose boundary is at 400 m on the south side and at sea level on the north side of the peninsula is thus relatively undamaged. The observations reported here suggest that the butterfly fauna is most diverse in areas of primary and mature secondary forest, and thus that many of these species can tolerate a small degree of habitat disturbance. The forest-dwelling dragonflies of Paria can tolerate a similar level of habitat disturbance (Convey, 1989).

Twelve of the 83 butterfly species recorded (including five yet to be identified) do not occur on the neighbouring island of Trinidad (M. Cock, pers. comm.). All but